FACT SHEET

BMDO Fact Sheet

GROUND BASED INTERCEPTOR

Introduction

The National Missile Defense System, known as NMD, is being designed to protect the United States from long-range ballistic missile attack. The system will be composed of early warning sensors to detect missile attacks, sensors to track and identify the attacking missile warheads, command and control processors to develop and execute the defense engagement plans, and interceptor missiles to engage and destroy the threatening warheads.

The Ground Based Interceptor, or GBI, is the NMD element consisting of the interceptor missiles and the support equipment needed to engage and destroy ballistic missile warheads outside of the atmosphere. An interceptor missile is composed of two parts: the Booster Vehicle, or BV, and the Exoatmospheric Kill Vehicle, or EKV. The BV consists of a multiple stage rocket designed to propel the EKV at very high velocities towards the threatening warheads. The EKV contains the onboard sensors and computers needed to pinpoint and destroy the threatening warhead by force of impact. The interceptors will be based in hardened silos and will be capable of launch around-the-clock on very short notice.

GBI Operational Concept

Once a ballistic missile attack is detected by early warning sensors, the NMD Battle Management Command, Control, and Communications element, known as the BMC3, uses data from NMD tracking sensors and radars to formulate the engagement plan and compute the intercept locations. The BMC3 sends the engagement plan to the GBI element along with authority to release its interceptors to engage the threat. The GBI command launch processor computes the interceptor launch times and flight profiles and loads the data into the interceptor's on-board computers. At the required time, each interceptor is launched from its silo against its identified target. The BV rocket motors propel the interceptor towards the threat on the preplanned flight profile. The EKV separates following booster burnout and flies a ballistic trajectory towards the targeted warhead. Threat trajectory updates from the BMC3 are used by the EKV to make course corrections prior to final homing. During final homing, the EKV acquires the threat with onboard sensors and processes the data and selects the threat warhead to be intercepted. Once the target is selected, onboard sensors provide guidance information necessary to achieve hit-to-kill intercept, destroying the warhead on impact.

PLV Launch at KMR

Program Management and NMD Prime Contractor

The NMD Joint Program Office (JPO) of the Ballistic Missile Defense Organization, also known as BMDO, manages the NMD program. The JPO, located in Washington, DC is responsible for overseeing the NMD development and deployment efforts. Within the JPO, the GBI Project Management Office, located in Huntsville, AL oversees the GBI development effort.

The Boeing Company is the NMD Prime Contractor tasked with the design, development, testing, and integration of the NMD system. Once approved, Boeing will also deploy the NMD system. Major subcontractors for this large effort include: Raytheon, Alliant, Chemical Systems Division of Pratt-Whitney, Northrup Grumman, Logicon, Lockheed Martin, and others.

Interceptor Development

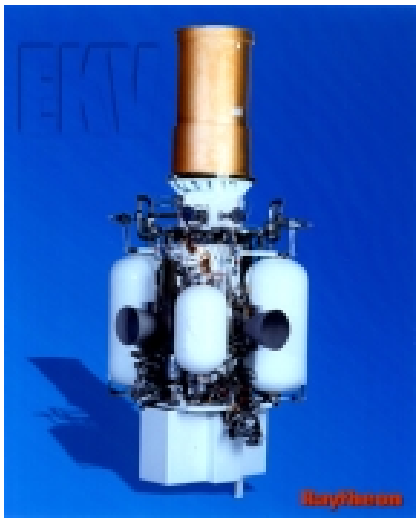
The GBI is a culmination of major interceptor developments that began in the 1980s. The interceptor is based on proven technology. The GBI design passed its critical design review in 2000 and is now in the process of incremental testing. The EKV design has been tested in flight, and the BV design will be flight tested in 2001.

EKV Development

The EKV is the front end of the interceptor that destroys the threatening warheads by direct impact. The EKV is composed of two major parts: the kill vehicle, or KV, and the adaptor assembly. The KV consists of a three waveband electro-optical sensor, an inertial navigation system, a flight divert system, an attitude control system, a processing system and software, power, communications, and the vehicle structure. The adaptor provides the interface with the BV part of the interceptor missile, a cooling system for the sensor, power conditioning, and the EKV/BV separation system. Raytheon is building the EKV for GBI in Tucson, AZ.

Booster Vehicle Development

The BV utilizes commercial off-the-shelf rocket motor assemblies and consists of three stages. Each stage consists of a rocket motor, a thrust controller, and avionics control hardware. The first stage also includes an



Raytheon EKV

attitude control system that helps stabilize the vehicle during initial liftoff from the silo and controls roll rate during flight. The BV design has progressed and initial vehicles have been assembled and ground tested. The first BV flight test is scheduled for the summer of 2001.

In addition to the BV development there are also ongoing efforts to evaluate options for reducing technical and schedule risks associated with the GBI, including the development of a backup booster option involving proven technologies. Alternative booster vehicle options that mitigate GBI booster risk, while also offering growth capability and providing the United States flexible and responsive defense from the evolving ballistic missile threat, are currently under evaluation.

BV-1 Vehicle and Canister

Payload Launch Vehicle

Current EKV flight testing utilizes a Payload Launch Vehicle, or PLV, derived from other BMDO programs. The PLV consists of two government furnished rocket motor stages, an upper assembly that includes guidance and control, a payload section to mount the EKV, and a nose faring. In addition, the PLV includes the required support equipment and software to interface with the BMC3 and to perform launch operations. Lockheed produces the PLV in Sunnyvale, CA.

Ground Support System Development

The Ground Support System (GSS) provides the GBI interface to the BMC3 and the command and launch equipment necessary to launch the interceptor. It also includes the missile silo, launch site equipment, ground handling equipment, and all special test equipment needed for the flight test program. The GSS will provide operational interceptor monitoring, all prelaunch operations and interceptor launch control. It utilizes commercial-off-the-shelf electronics to the maximum extent possible.

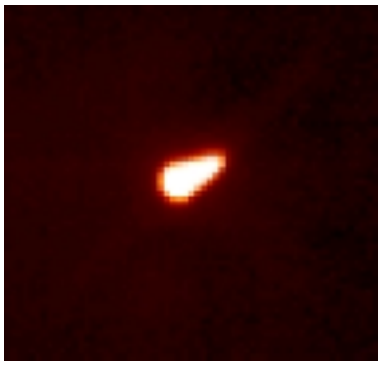
Test Program

The GBI element is an integral part of all phases of NMD testing. GBI simulations and hardware-in-the-loop components are included in NMD integrated ground tests, pre-mission tests, system simulations, and system integration activities.

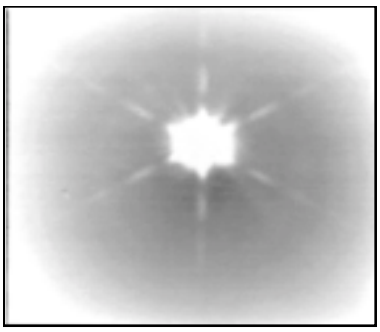
GBI components have formed the core of the NMD Integrated Flight Test (IFT) Program. The PLV and associated ground support systems have performed the launch operations and booster flyout at Kwajalein Missile Range (KMR) for all tests to date. Captive EKV sensors were flown on the successful IFT-1A and IFT-2 tests in 1997 and 1998. Critical sensor performance and target signature data were collected which reduced the risk for the early KV flights.

IFT-3, the first KV flight test, resulted in the first NMD intercept in October 1999. Numerous sensor and data sources confirmed the successful operation of the KV, PLV, and ground systems. The IFT-4 mission in January 2000 also performed well. However, a failure in the on-board sensor cooling system degraded sensor performance causing disruption in the final guidance required to hit the target, thus resulting in a small distance miss. The IFT-5 mission in July 2000 also resulted in a miss when an avionics failure in the PLV prevented the EKV from separating from the PLV. Although IFT-4 and 5 failed to achieve intercepts, valuable data on NMD system performance were gathered.

BV demonstration flight tests are scheduled to begin in 2001. The initial BV tests from Vandenburg Air Force Base will be GBI element only tests with a surrogate payload. Upon successful demonstration of an operational booster vehicle, integrated flight tests with the entire operational interceptor and NMD system elements will begin.



IFT-3 EKV View of Medium Reentry Vehicle Shortly Before Impact



IFT-3 Impact as seen from Super Radot

Summary

The GBI program is developing the hit-to-kill interceptor required to engage and destroy ballistic missile warheads outside the atmosphere before they impact within the borders of the United States. Based on a legacy of interceptor development and technology spanning several decades, the GBI program is currently building, testing and successfully demonstrating the hardware and software needed for the missile defense of our nation.

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